

THAT WHICH IS CLAIMED IS:

1. A method for demodulating a received digitally modulated signal subjected to multipath propagation impairment, the method comprising:

estimating the multipath propagation impairment of  
5 the received digitally modulated signal;

estimating at least one symbol of the received digitally modulated signal;

adjusting the at least one estimated symbol based upon the estimated multipath propagation impairment to  
10 generate an estimate of the at least one symbol as impaired by the multipath propagation;

generating at least one error signal by comparing the estimate of the at least one symbol as impaired by the multipath propagation to the received digitally  
15 modulated signal; and

using the at least one error signal for estimating remaining symbols to be demodulated.

2. A method according to Claim 1, further comprising using the at least one error signal for refining the estimated multipath propagation impairment.

3. A method according to Claim 2, further comprising:

estimating at least one next symbol; and

adjusting the estimate of the at least one next  
5 symbol based upon the refined estimated multipath propagation impairment for generating an estimate of the at least one next symbol as impaired by the multipath propagation.

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4. A method according to Claim 3, further comprising refining the at least one error signal by comparing the estimate of the at least one next symbol as impaired by the multipath propagation to the  
5 received digitally modulated signal.

5. A method according to Claim 4, wherein refining the at least one error signal further comprises comparing the estimate of the at least one next symbol as impaired by the multipath propagation to the at  
5 least one error signal resulting from at least one previous comparison.

6. A method according to Claim 1, wherein estimating the multipath propagation impairment is based upon an adaptive algorithm.

7. A method according to Claim 6, wherein the adaptive algorithm comprises a least mean square (LMS) algorithm.

8. A method according to Claim 7, further comprising applying a convergence coefficient to the LMS algorithm, with the convergence coefficient being based upon the received digitally modulated signal.

9. A method according to Claim 1, wherein estimating the at least one symbol is based upon an adaptive algorithm.

10. A method according to Claim 9, wherein the adaptive algorithm comprises a least mean square (LMS) algorithm.

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11. A method according to Claim 10, further comprising applying a convergence coefficient to the LMS algorithm, with the convergence coefficient being based upon the digital signal.

12. A method according to Claim 1, wherein estimating the multipath propagation impairment is based upon a training waveform embedded in the received digitally modulated signal.

13. A method according to Claim 1, wherein estimating the at least one symbol is based upon a training waveform embedded in the received digitally modulated signal.

14. A method according to Claim 1, wherein estimating the remaining symbols to be demodulated is based upon linear estimation.

15. A method according to Claim 1, wherein estimating the multipath propagation impairment is performed during at least one interval of clear-channel reception.

16. A method according to Claim 1, wherein estimating the multipath propagation impairment is performed during at least one interval of benign multipath propagation impairment.

17. A method according to Claim 1, wherein estimating the at least one symbol is performed during at least one interval of clear-channel reception.

18. A method according to Claim 1, wherein estimating the at least one symbol is performed during

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at least one interval of benign multipath propagation impairment.

19. A method according to Claim 1, wherein estimating the at least one symbol is based upon maximum likelihood sequence estimation (MLSE).

20. A method according to Claim 1, wherein the received digitally modulated signal comprises at least one of a digital broadcast television signal, a digital broadcast radio signal, a digital cellular telephone  
5 signal, and a digital wireless local area network (LAN) signal.

21. A method according to Claim 1, wherein the received digitally modulated signal comprises a digitally serial modulated signal.

22. A method for simultaneously demodulating a plurality of received digitally modulated signals subjected to multipath propagation impairments, the method comprising:

5 estimating the multipath propagation impairments of the plurality of received digitally modulated signals;

estimating at least one symbol of each of the plurality of received digitally modulated signals;

10 adjusting each of the at least one estimated symbols based upon the corresponding estimated multipath propagation impairment to generate an estimate of each of the at least one symbols as impaired by the corresponding multipath propagation;

15 generating at least one error signal by comparing a summation of the estimates of the at least one symbols as impaired by the corresponding multipath

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propagation to the plurality of received digitally modulated signals; and

using the at least one error signal for estimating remaining symbols of each of the plurality of received  
5 digitally modulated signals to be demodulated.

23. A method according to Claim 22, further comprising using the at least one error signal for refining each estimated multipath propagation impairment.

24. A method according to Claim 23, further comprising:

estimating at least one next symbol of each of the plurality of received digitally modulated signals; and

adjusting the estimates of each of the at least one next symbols based upon the corresponding refined estimated multipath propagation impairment for generating estimates of the at least one next symbols as impaired by the corresponding multipath propagation.

25. A method according to Claim 24, further comprising refining the at least one error signal by comparing a summation of estimates of the at least one next symbols as impaired by the corresponding multipath  
5 propagation to the plurality of received digitally modulated signals.

26. A method according to Claim 25, wherein refining the at least one error signal further comprises comparing the summation of estimates of the at least one next symbols as impaired by the  
5 corresponding multipath propagation to the at least one error signal resulting from at least one previous comparison.

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27. A method according to Claim 22, wherein estimating the multipath propagation impairments of each of the plurality of received digitally modulated signals is based upon a respective adaptive algorithm.

28. A method according to Claim 22, wherein estimating the at least one symbol of each of the plurality of received digitally modulated signals is based upon a respective adaptive algorithm.

29. A method according to Claim 22, wherein estimating the multipath propagation impairments is based upon training waveforms embedded in the plurality of received digitally modulated signals.

30. A method according to Claim 22, wherein estimating each of the at least one symbols is based upon training waveforms embedded in the plurality of received digitally modulated signals.

31. A method according to Claim 22, wherein estimating the remaining symbols of each of the plurality of received digitally modulated signals to be demodulated is based upon linear estimation.

32. A method according to Claim 22, wherein the plurality of received digitally modulated signals comprises at least one of a digital broadcast television signal, a digital broadcast radio signal, a  
5 digital cellular telephone signal, and a digital wireless local area network (LAN).

33. A method according to Claim 22, wherein each of the plurality of received digitally modulated

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signals comprises a digitally serial modulated signal.

34. A digital receiver comprising:

a channel estimator for estimating multipath propagation impairment of a received digitally modulated signal;

- 5 a symbol estimator connected to said channel estimator for estimating at least one symbol of the received digitally modulated signal, said channel estimator adjusting the at least one estimated symbol based upon the estimated multipath propagation
- 10 impairment to generate an estimate of the at least one symbol as impaired by the multipath propagation; and
- a summing network connected to said channel estimator and said symbol estimator for generating at least one error signal by comparing the estimate of the
- 15 at least one symbol as impaired by the multipath propagation to the received digitally modulated signal;
- said symbol estimator using the at least one error signal for estimating remaining symbols to be demodulated.

35. A digital receiver according to Claim 34, wherein said channel estimator uses the at least one error signal for refining the corresponding estimated multipath propagation impairment.

36. A digital receiver according to Claim 35, wherein said symbol estimator estimates at least one next symbol, and adjusts the estimate of the at least one next symbol based upon the refined estimated
- 5 multipath propagation impairment for generating an estimate of the at least one next symbol as impaired by the multipath propagation.

37. A digital receiver according to Claim 36,  
wherein said summing network further refines the at  
least one error signal by comparing the estimate of the  
at least one next symbol as impaired by the multipath  
5 propagation to the received digitally modulated signal.

38. A digital receiver according to Claim 37,  
wherein said summing network refines the at least one  
error signal by comparing the estimates of the at least  
one next symbol as impaired by the multipath  
5 propagation to the at least one error signal resulting  
from at least one previous comparison.

39. A digital receiver according to Claim 34,  
wherein said channel estimator further comprises an  
adaptive algorithm for estimating the multipath  
propagation impairment.

40. A digital receiver according to Claim 39,  
wherein the adaptive algorithm comprises a least mean  
square (LMS) algorithm.

41. A digital receiver according to Claim 34,  
wherein said symbol estimator further comprises an  
adaptive algorithm for estimating the at least one  
symbol.

42. A digital receiver according to Claim 41,  
wherein the adaptive algorithm comprises a least mean  
square (LMS) algorithm.

43. A digital receiver according to Claim 34,  
wherein estimating the multipath propagation impairment  
is based upon a training waveform embedded in the  
received digitally modulated signal.

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44. A digital receiver according to Claim 34, wherein estimating the at least one symbol is based upon a training waveform embedded in the received digitally modulated signal.

45. A digital receiver according to Claim 34, wherein estimating the remaining symbols to be demodulated is based upon linear estimation.

46. A digital receiver according to Claim 34, wherein the received digitally modulated signal comprises at least one of a digital broadcast television signal, a digital broadcast radio signal, a  
5 digital cellular telephone signal, and a digital wireless local area network (LAN) signal.

47. A digital receiver according to Claim 34, wherein the received digitally modulated signal comprises a digitally serial modulated signal.

48. A digital receiver for simultaneously demodulating a plurality of received digitally modulated signals subjected to multipath propagation impairments, the digital receiver comprising:

5 a plurality of channel estimators for estimating the multipath propagation impairments of the plurality of received digitally modulated signals;

a plurality of symbol estimators connected to said plurality of channel estimators for estimating at least  
10 one symbol of each of the plurality of received digitally modulated signals, said plurality of channel estimators for adjusting each of the at least one estimated symbols based upon corresponding estimated multipath propagation impairments to generate an

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15 estimate of each of the at least one symbols as  
impaired by the multipath propagation; and

a summing network connected to said plurality of  
channel estimators and to said plurality of symbol  
estimators for generating at least one error signal by  
20 comparing a summation of estimates of the at least one  
symbols as impaired by the corresponding multipath  
propagation to the plurality of received digitally  
modulated signals;

said plurality of symbol estimators using the at  
25 least one error signal for estimating remaining symbols  
of each of the plurality of received digitally  
modulated signals to be demodulated.

49. A digital receiver according to Claim 48,  
wherein said plurality of channel estimators uses the  
at least one error signal for refining each estimated  
multipath propagation impairment.

50. A digital receiver according to Claim 49,  
wherein said plurality of symbol estimators estimates  
at least one next symbol of each of the plurality of  
received digitally modulated signals, and adjusts the  
5 estimates of each of the at least one next symbols  
based upon the refined corresponding estimated  
multipath propagation impairment for generating  
estimates of the at least one next symbols as impaired  
by the corresponding multipath propagation.

51. A digital receiver according to Claim 50,  
wherein said summing network refines the at least one  
error signal by comparing a summation of estimates of  
each of the at least one next symbols as impaired by  
5 the corresponding multipath propagation to the  
plurality of received digitally modulated signals.

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52. A digital receiver according to Claim 51,  
wherein said summing network refines the at least one  
error signal by comparing the summation of estimates of  
the at least one next symbols as impaired by the  
5 corresponding multipath propagation to the at least one  
error signal resulting from at least one previous  
comparison.

53. A digital receiver according to Claim 48,  
wherein estimating the multipath propagation  
impairments of each of the plurality of received  
digitally modulated signals is based upon a respective  
5 adaptive algorithm.

54. A digital receiver according to Claim 48,  
wherein estimating the at least one symbol of each of  
the plurality of received digitally modulated signals  
is based upon a respective adaptive algorithm.

55. A digital receiver according to Claim 48,  
wherein estimating the multipath propagation  
impairments is based upon training waveforms embedded  
in the plurality of received digitally modulated  
5 signals.

56. A digital receiver according to Claim 48,  
wherein estimating each of the at least one symbols is  
based upon training waveforms embedded in the plurality  
of received digitally modulated signals.

57. A digital receiver according to Claim 48,  
wherein estimating remaining symbols of each of the  
plurality of received digitally modulated signals is  
based upon linear estimation.

